

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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CHARACTERIZING THE PYROELECTRIC COEFFICIENT FOR MACRO-FIBER COMPOSITES

Abstract

Pyroelectricity is a form of energy harvesting that uses temperature variation with time to produce electricity. Macro-Fiber composites (MFCs) are a piezoelectric material primarily used in applications that take advantage of the piezoelectric effect such as vibration damping and structural health monitoring. Since MFCs are made out of lead zirconate titanate (PZT) which is a ferroelectric material, it has the potential to exhibit the pyroelectric effect. To date this has not been characterized. The pyroelectric effect in MFCs has largely been ignored because it was assumed to be negligible. This paper will characterize the pyroelectric coefficient for MFCs by first modeling the secondary pyroelectric coefficient using material properties of MFCs, and then experimentally computing the total pyroelectric coefficient using a thermal chamber. The computed secondary pyroelectric coefficient was 18.15 microCoulombs/(m² – K). *The primary pyroelectric coefficient will be higher due to the primary effect having a more dominant influence in ferroelectric*